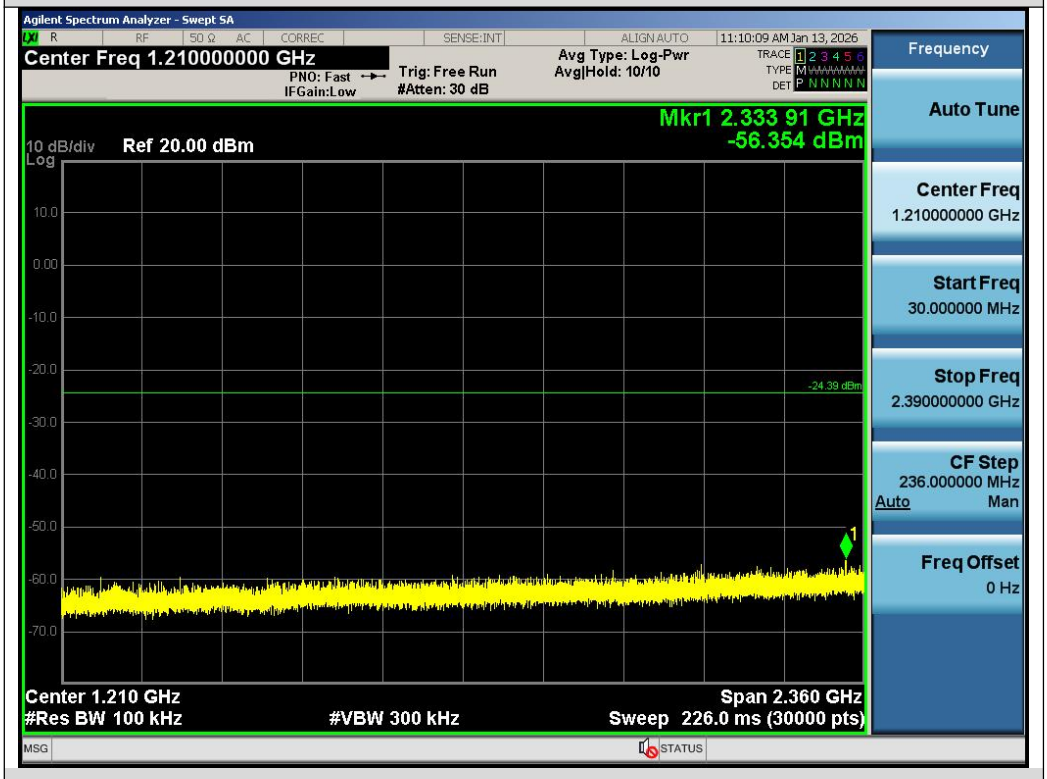
Test_Graph_EDR_ANT1_2402_3Mbps_Reference Level



Test_Graph_EDR_ANT1_2402_3Mbps_Lower Band Emissions

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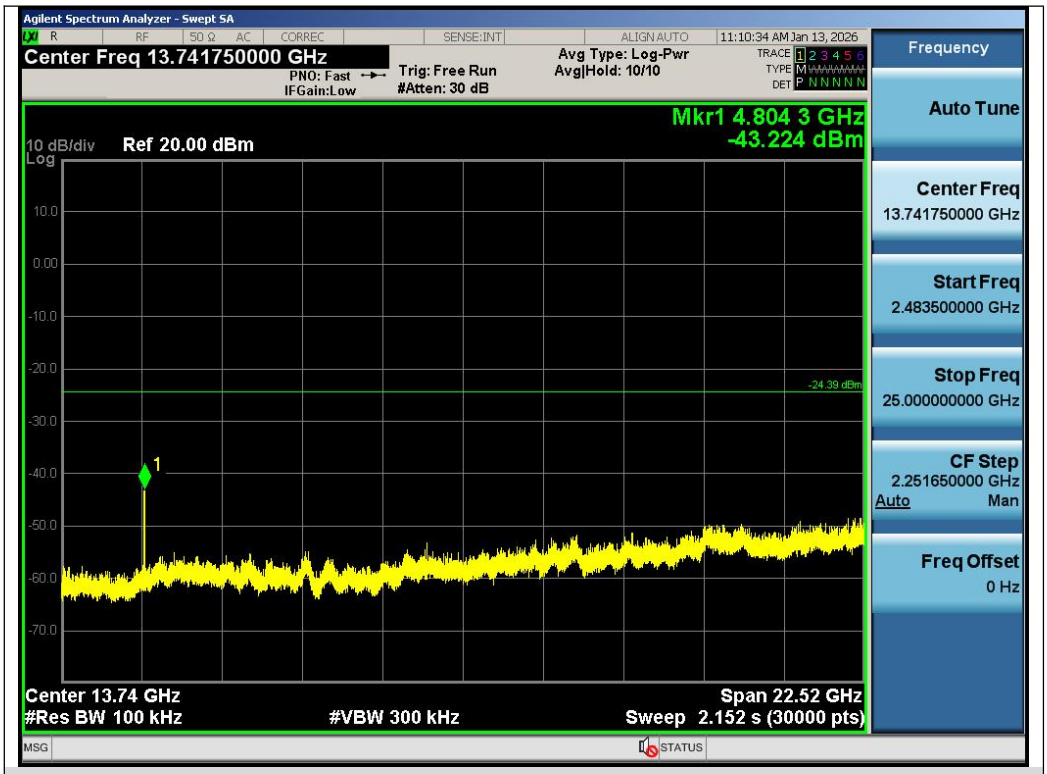

Test_Graph_EDR_ANT1_2402_3Mbps_Higher Band Emissions

Test_Graph_EDR_ANT1_2441_3Mbps_Reference Level

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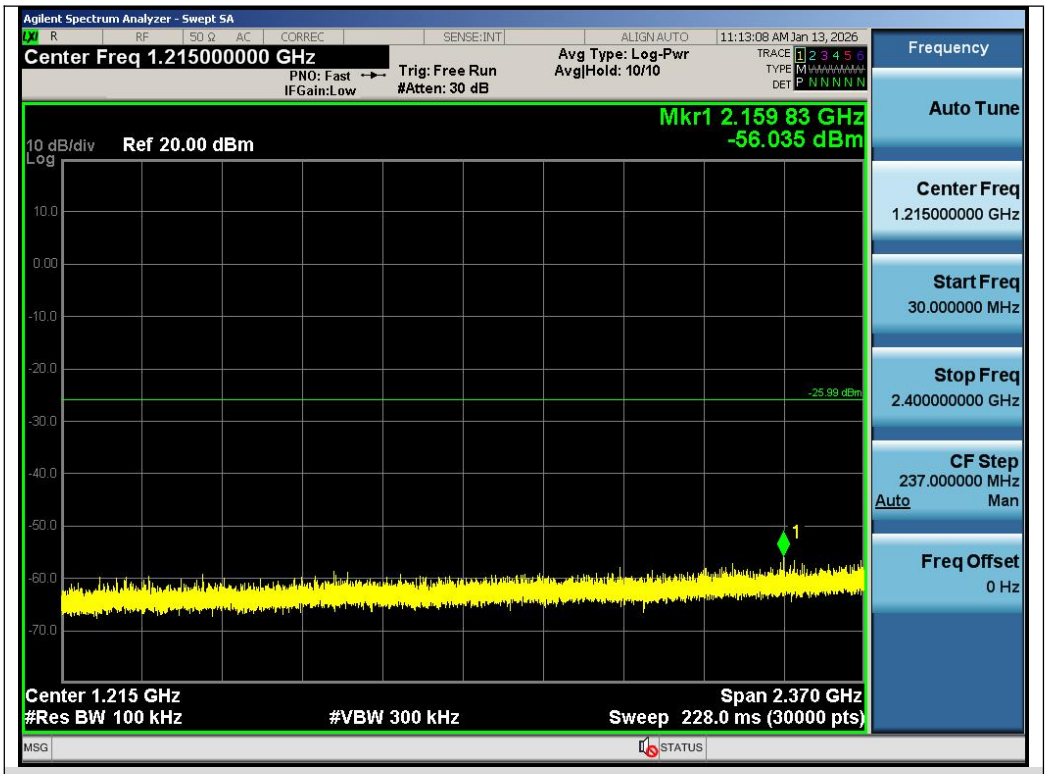
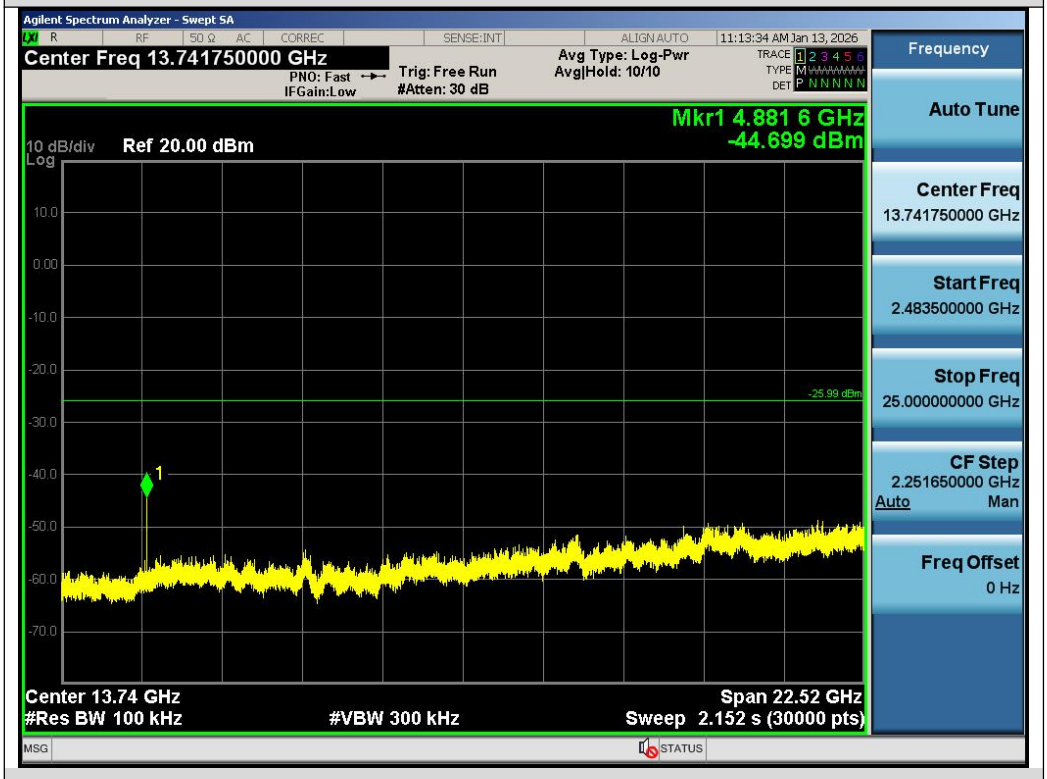


Test_Graph_EDR_ANT1_2441_3Mbps_Lower Band Emissions



Test_Graph_EDR_ANT1_2441_3Mbps_Higher Band Emissions

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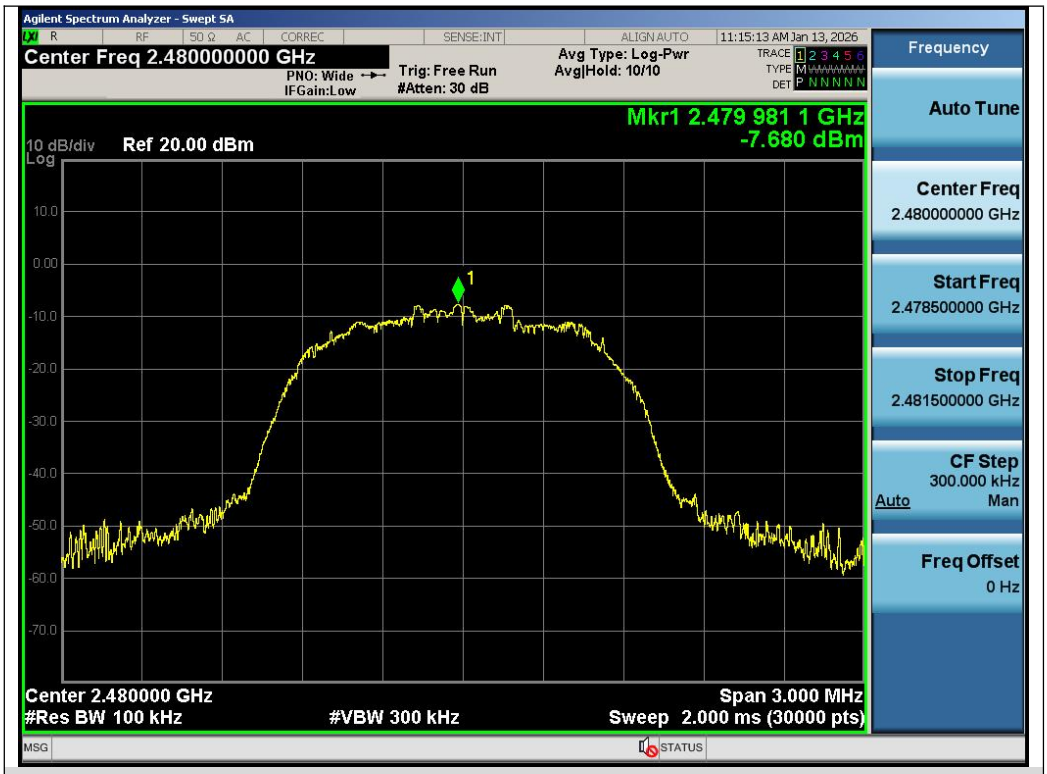
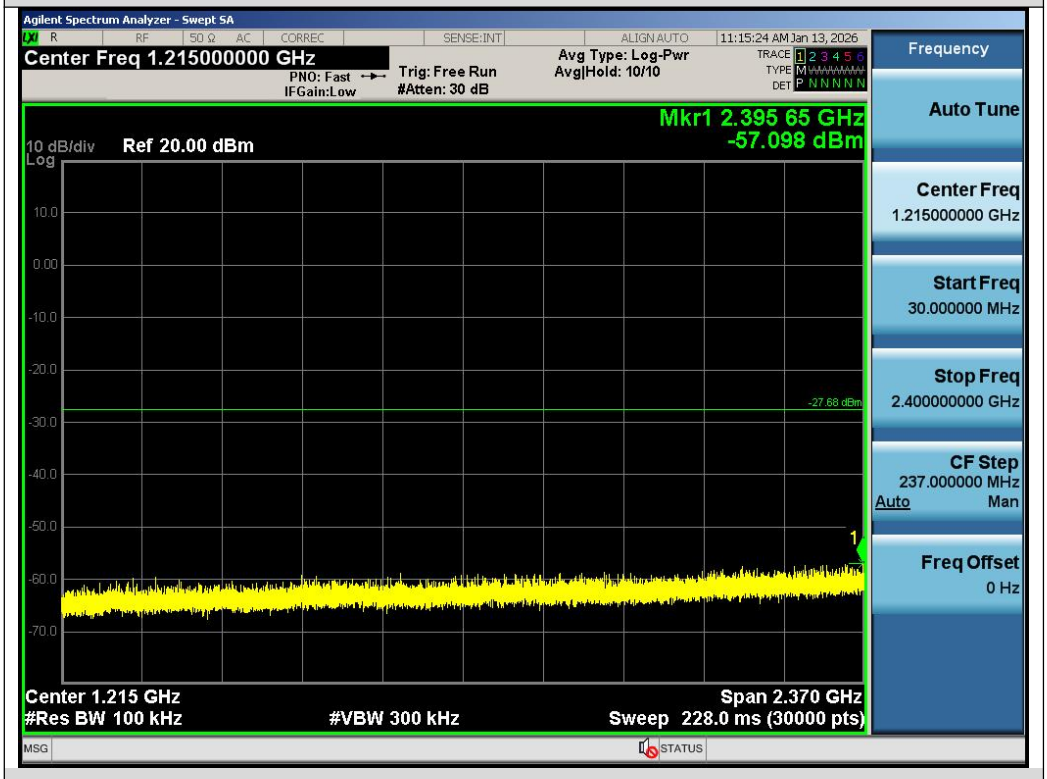


Test_Graph_EDR_ANT1_2480_3Mbps_Reference Level



Test_Graph_EDR_ANT1_2480_3Mbps_Lower Band Emissions

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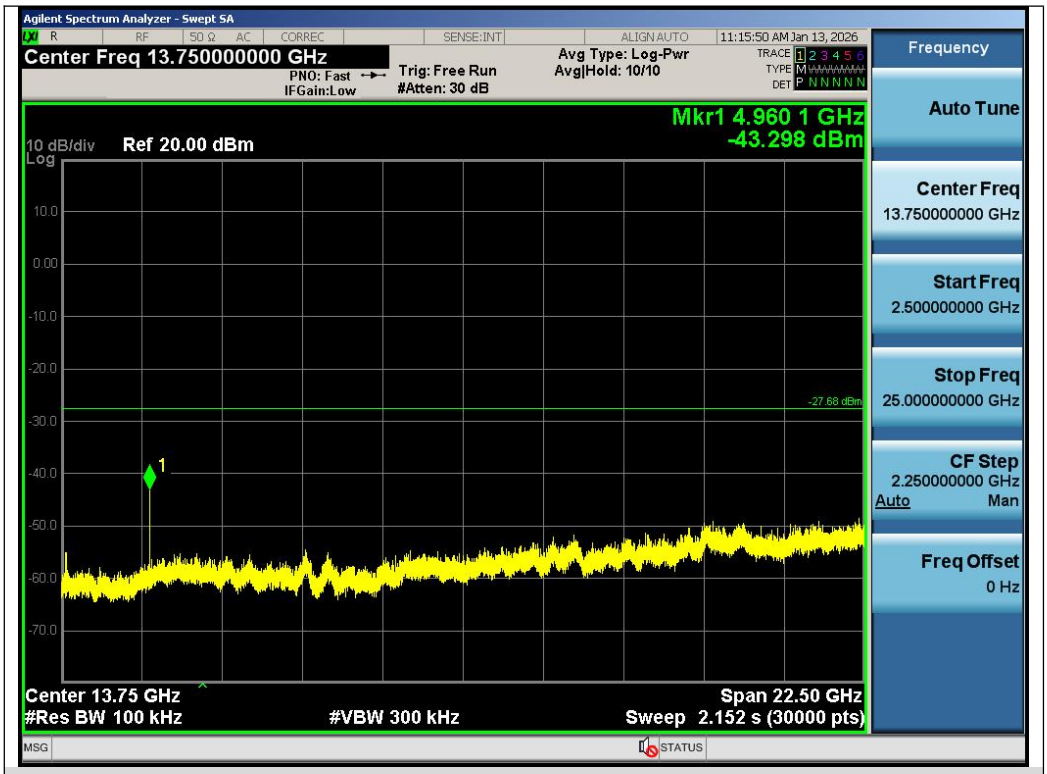

Test_Graph_EDR_ANT1_2480_3Mbps_Higher Band Emissions

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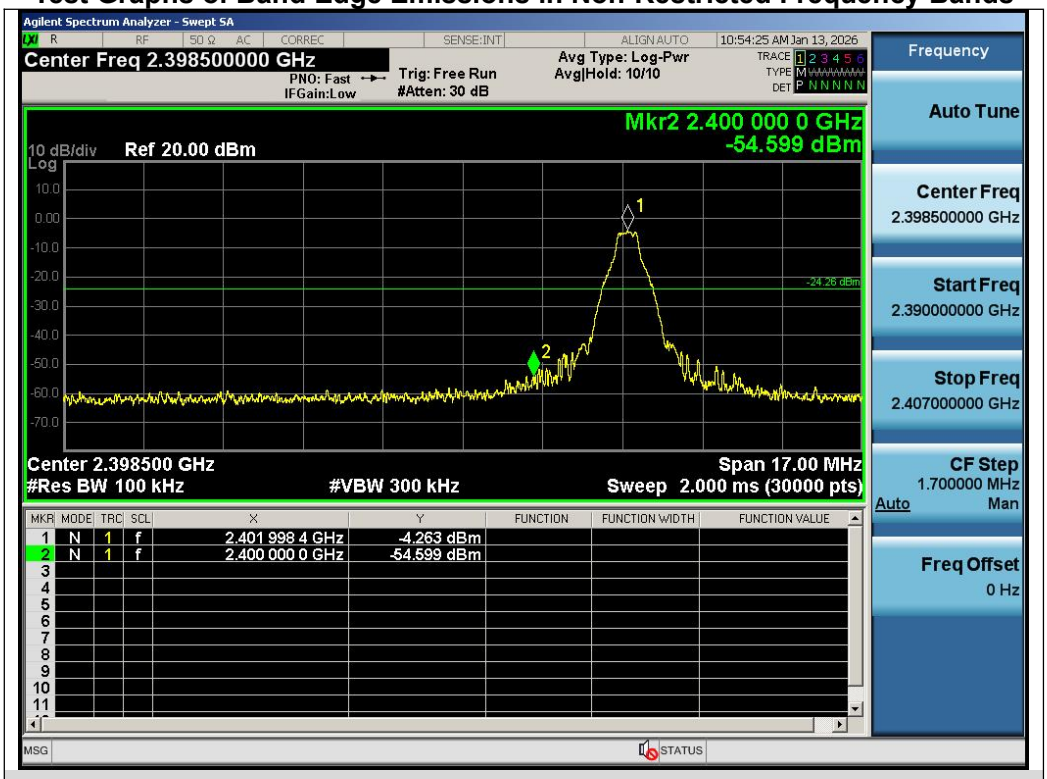
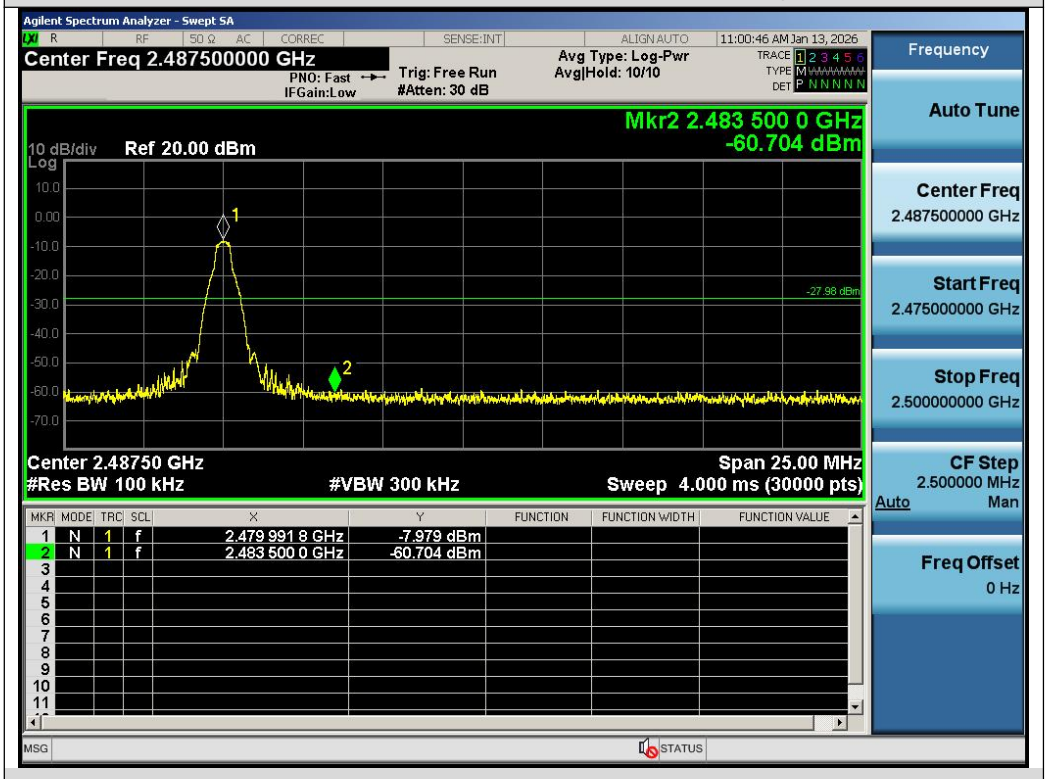
Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



Test_Graph_BR_ANT1_2402_1Mbps_Lower Band Edge Emissions



Test_Graph_BR_ANT1_2480_1Mbps_Higher Band Edge Emissions

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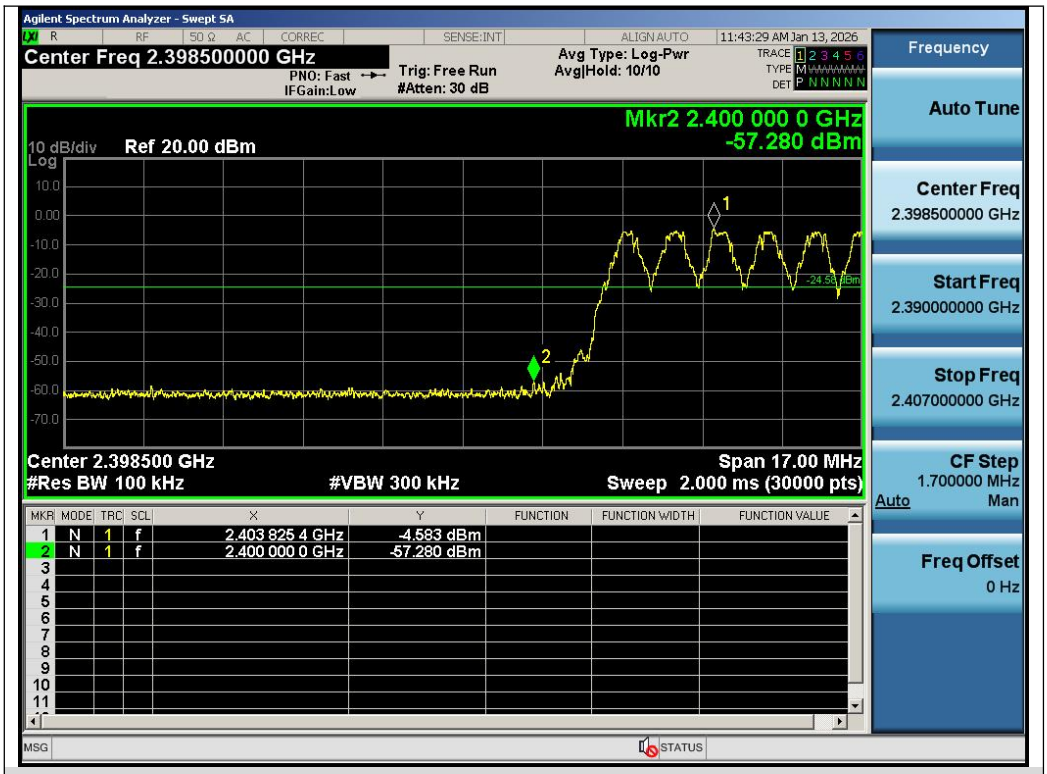
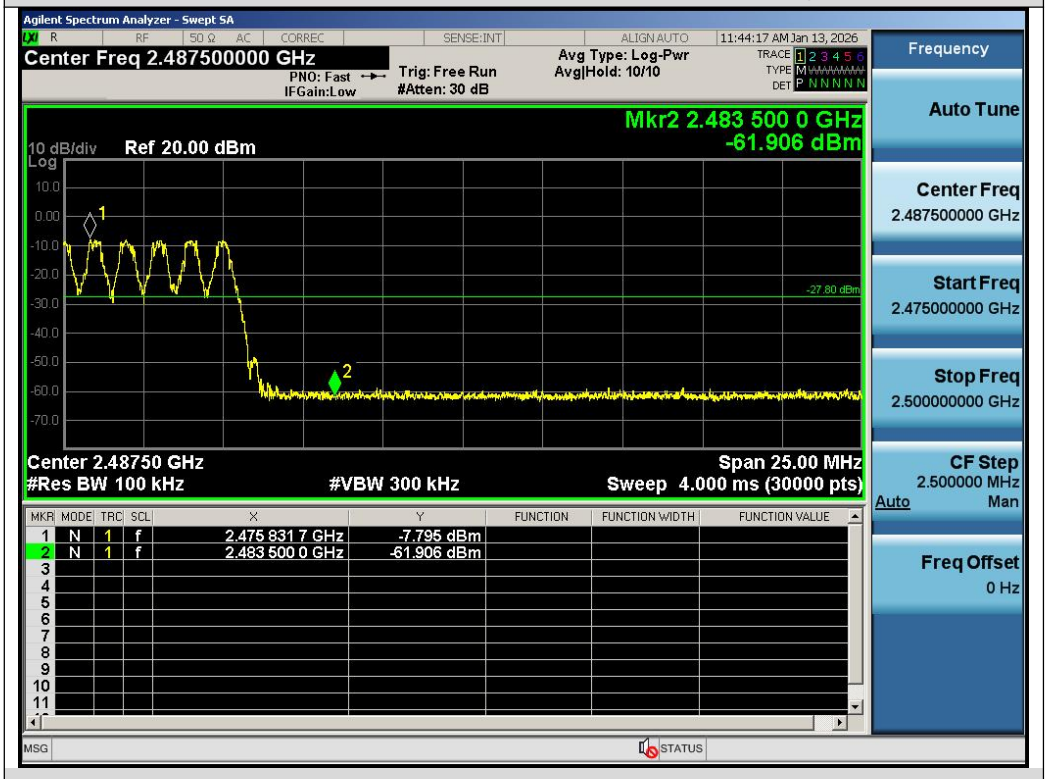


Test_Graph_BR_HOP_ANT1_NA_1Mbps_Lower Band Edge Emissions



Test_Graph_BR_HOP_ANT1_NA_1Mbps_Higher Band Edge Emissions

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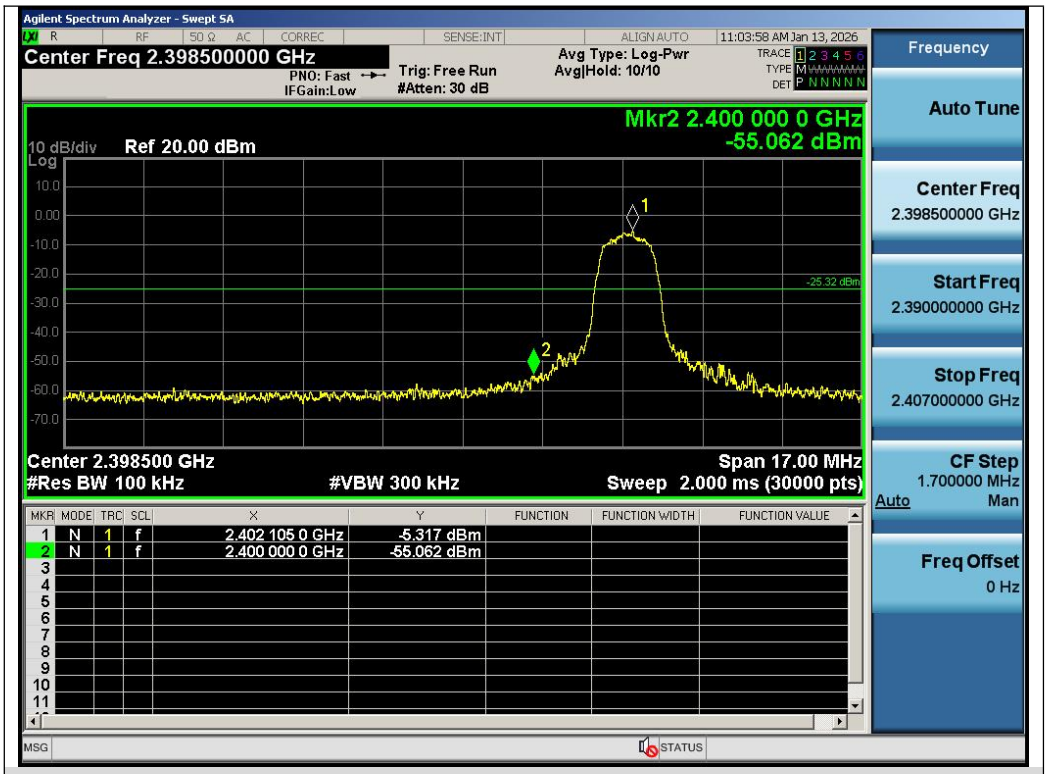
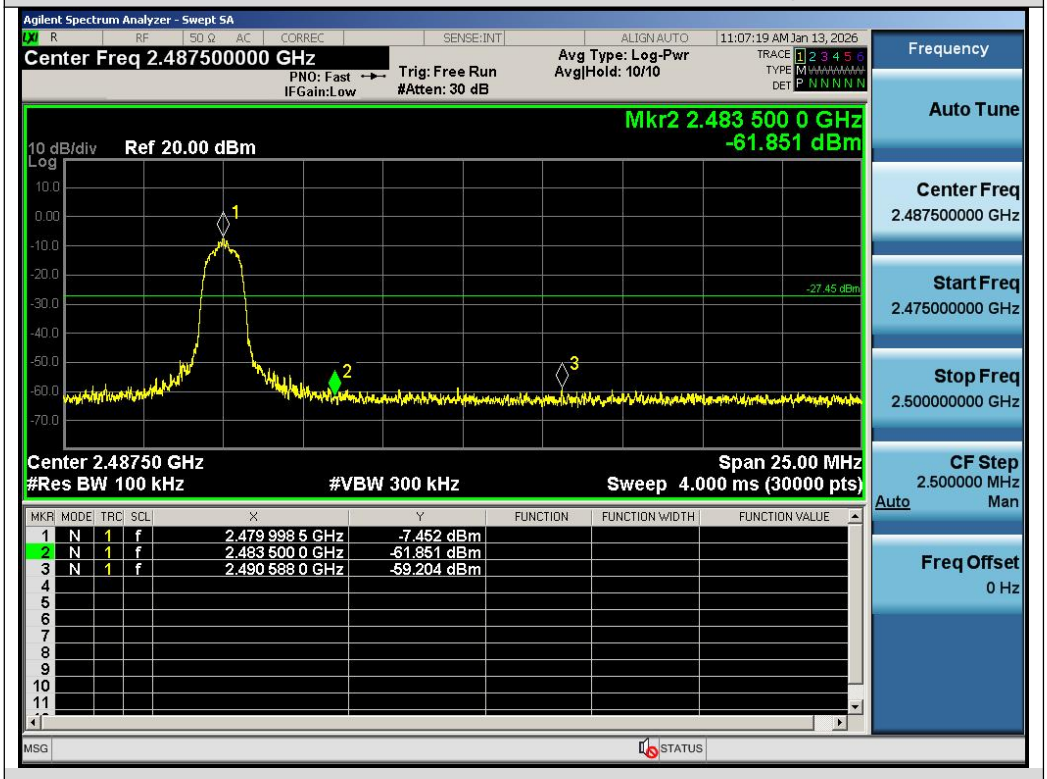


Test_Graph_EDR_ANT1_2402_2Mbps_Lower Band Edge Emissions



Test_Graph_EDR_ANT1_2480_2Mbps_Higher Band Edge Emissions

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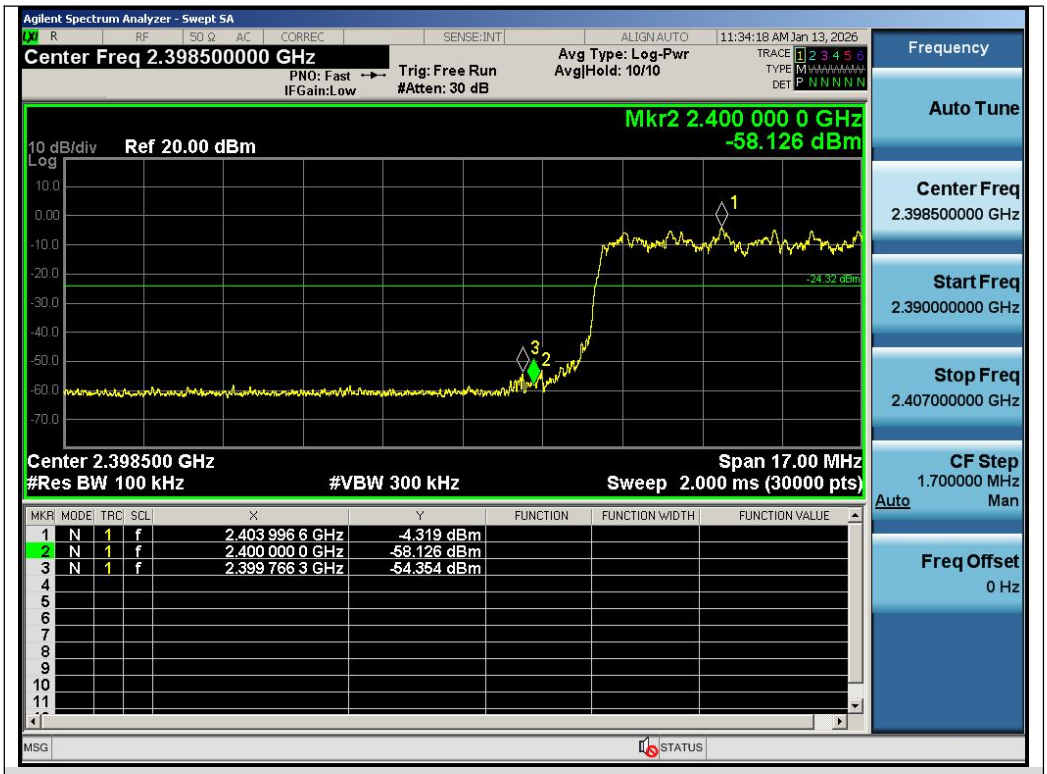
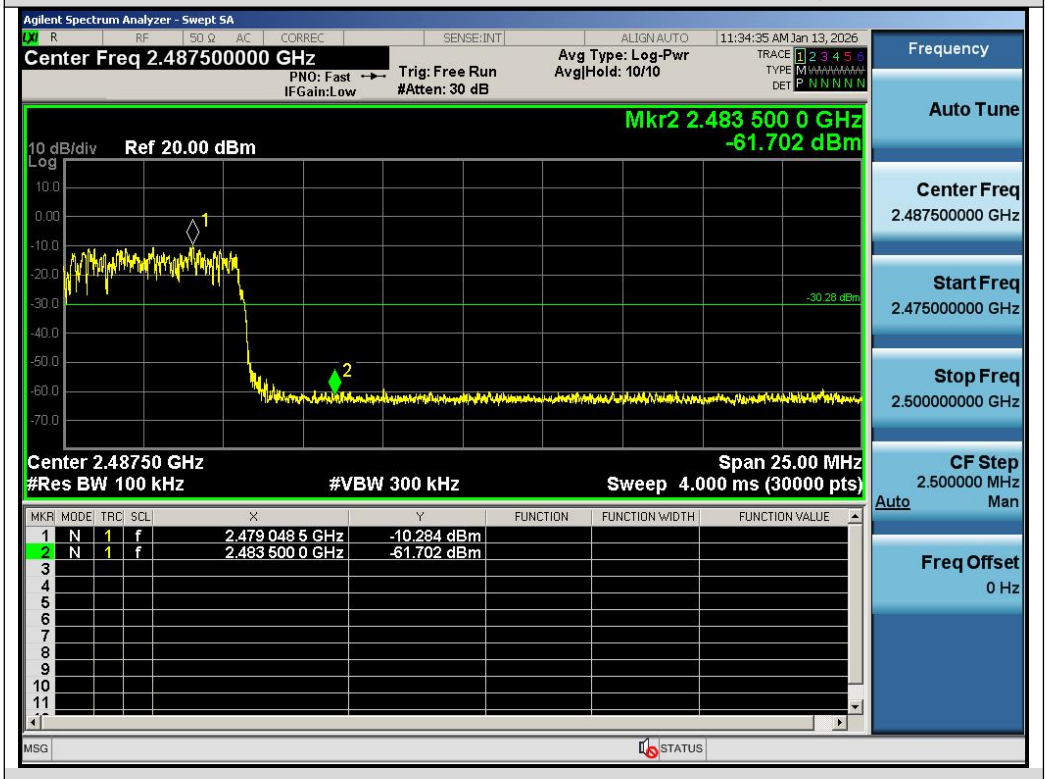


Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Lower Band Edge Emissions



Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Higher Band Edge Emissions

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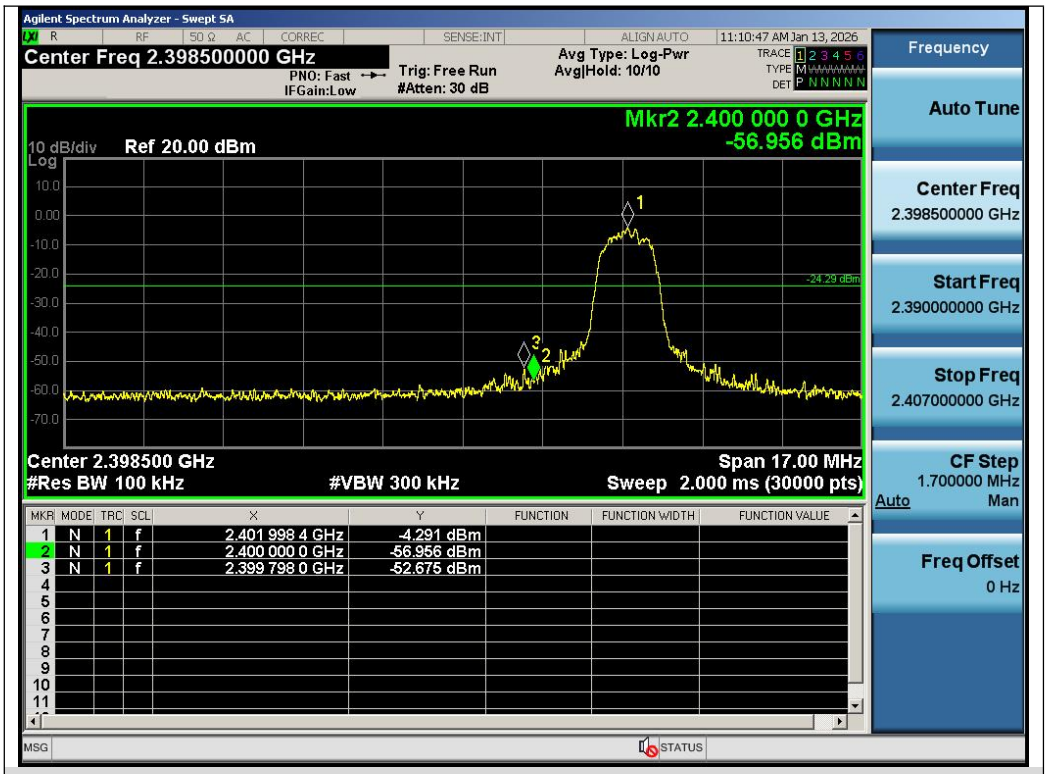
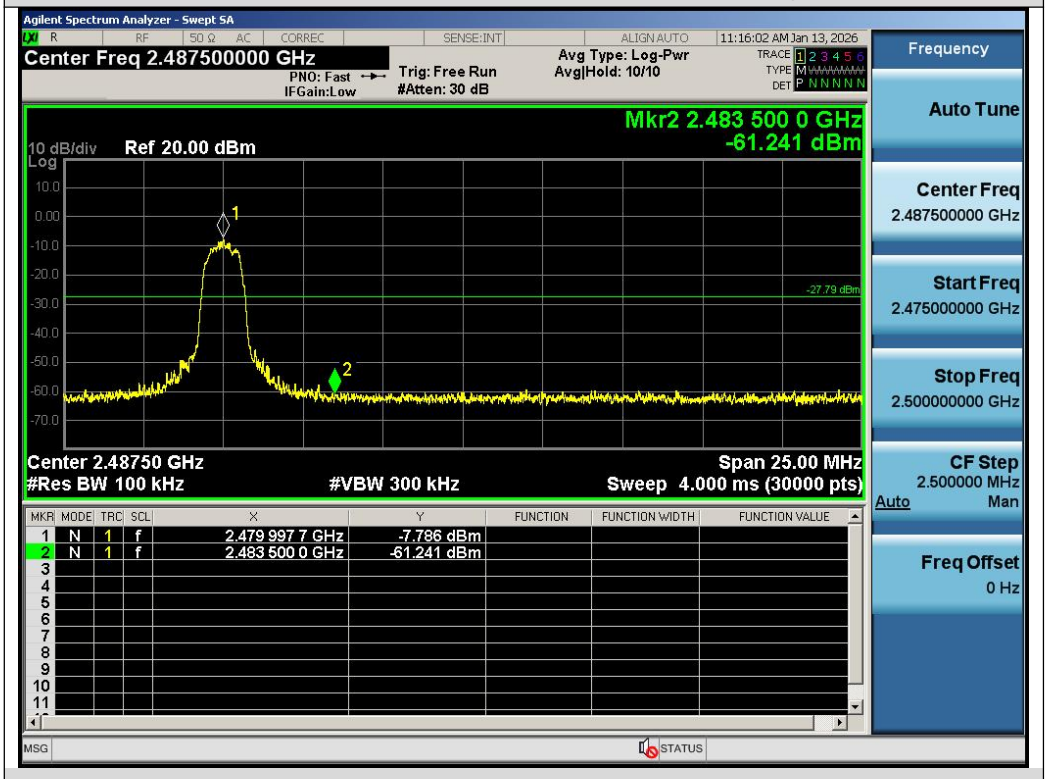


Test_Graph_EDR_ANT1_2402_3Mbps_Lower Band Edge Emissions



Test_Graph_EDR_ANT1_2480_3Mbps_Higher Band Edge Emissions

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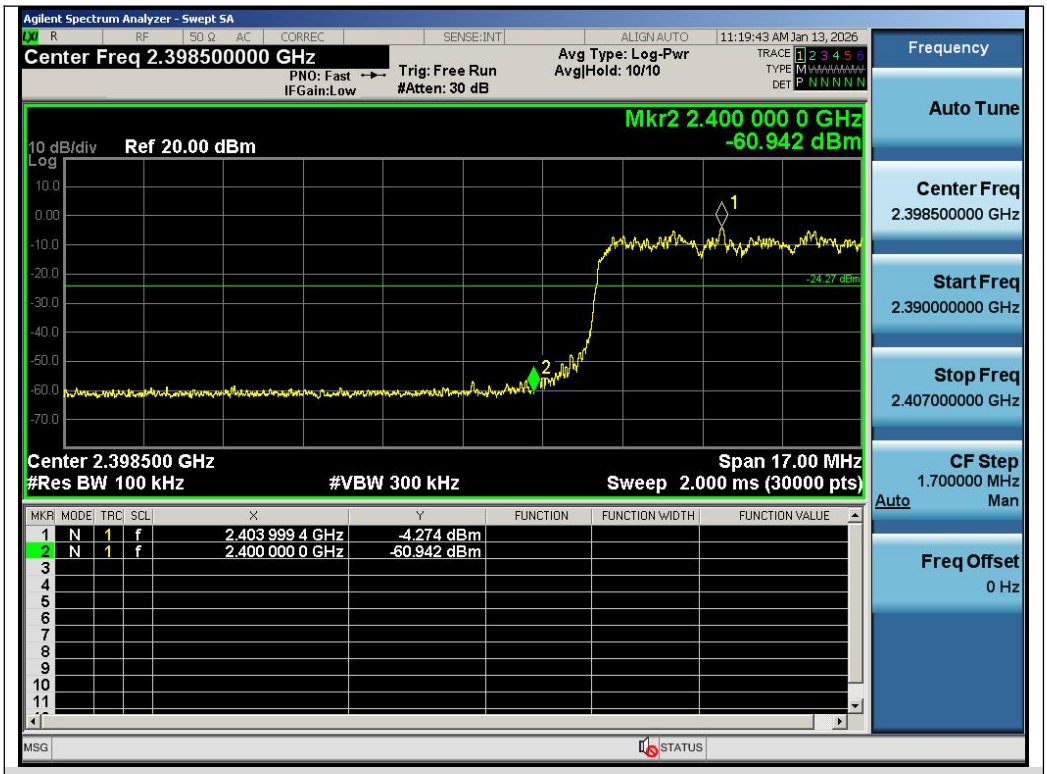
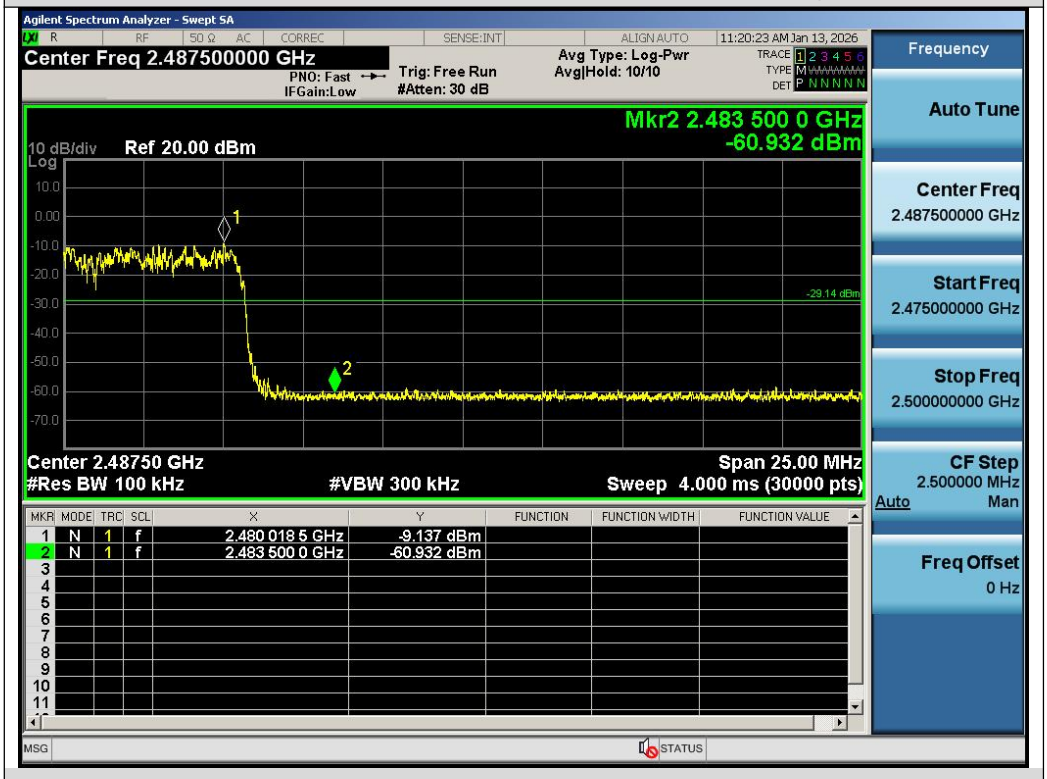


Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Lower Band Edge Emissions



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Higher Band Edge Emissions

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9. Radiated Spurious Emission

9.1 Measurement Limit

- 15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

9.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

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8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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- **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

- **Peak Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

- **Average Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = [3 × RBW]
4. Detector = Power averaging (rms)
5. Averaging type = power (i.e., rms)
6. Sweep time = auto
7. Perform a trace average of at least 100 traces.

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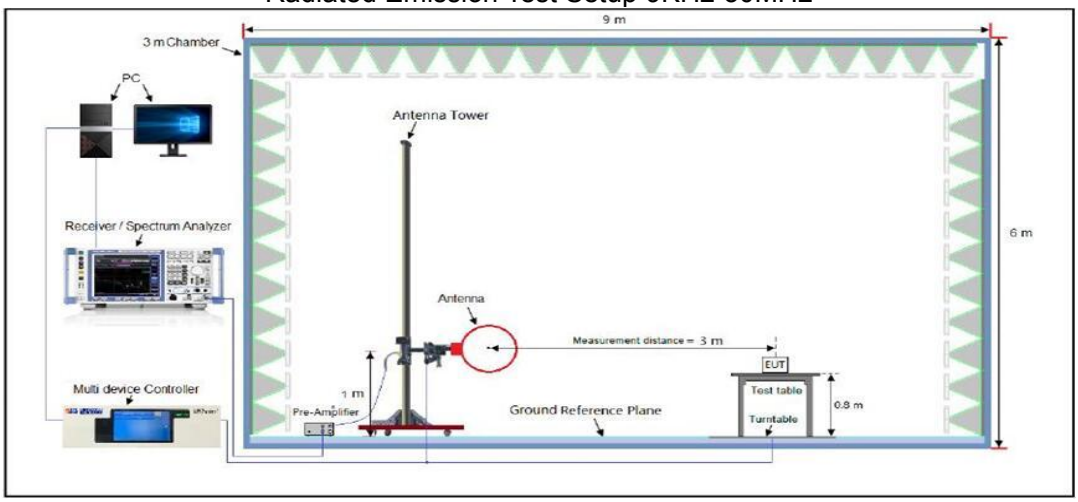
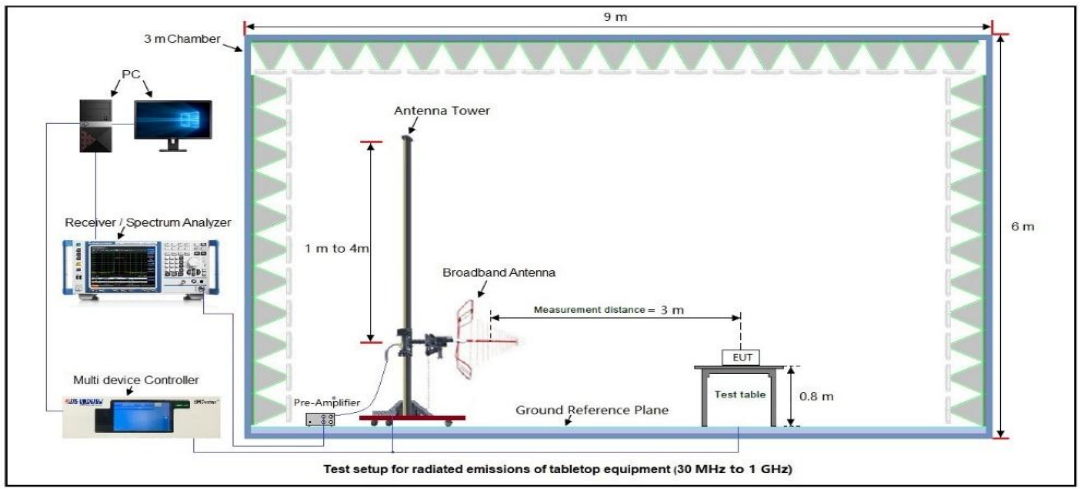
9.3 Measurement Setup (Block Diagram of Configuration)

Radiated Emission Test Setup 9KHz-30MHz

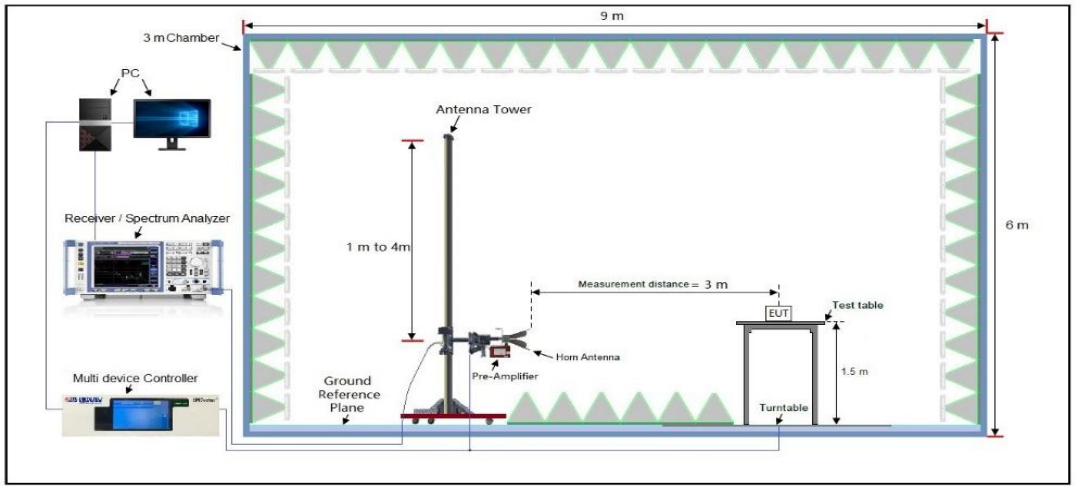


Radiated Emission Test Setup 30MHz-1000MHz



Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

Radiated Emission Test Setup Above 1000MHz



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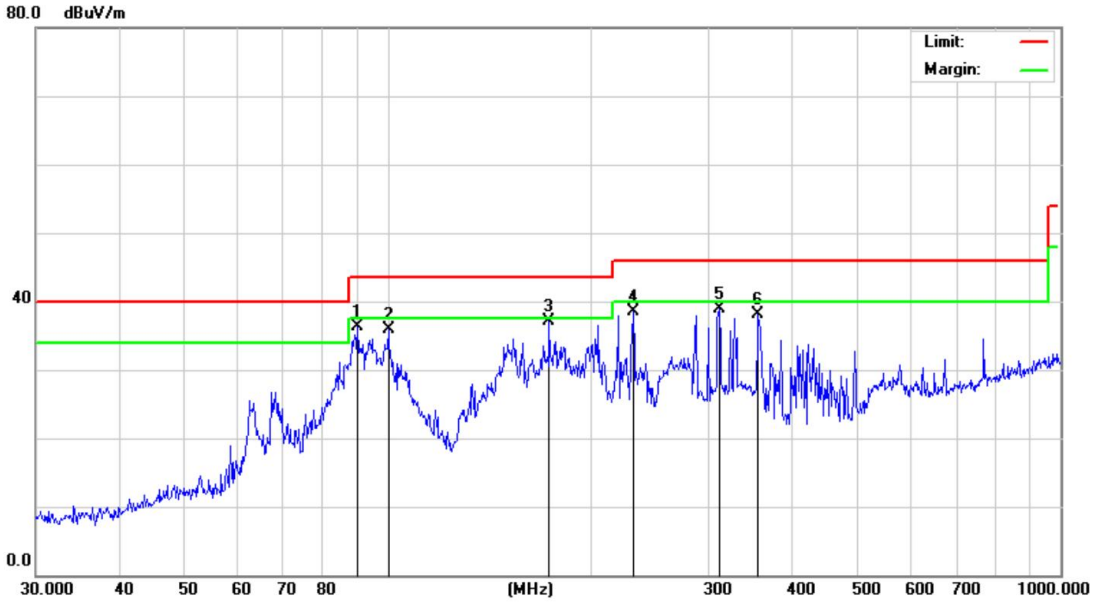
9.4 Measurement Result

Radiated Emission Below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	Antenna Polarity	Horizontal



Final Average Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	90.2205	36.35	-27.45	43.50	7.15	100	160	Horizontal
2	100.2286	35.87	-24.57	43.50	7.63	100	170	Horizontal
3	173.8135	37.18	-21.57	43.50	6.32	100	90	Horizontal
4	231.7178	38.48	-22.77	46.00	7.52	100	220	Horizontal
5	311.0867	38.86	-19.26	46.00	7.14	100	160	Horizontal
6	355.4273	38.18	-18.48	46.00	7.82	100	140	Horizontal

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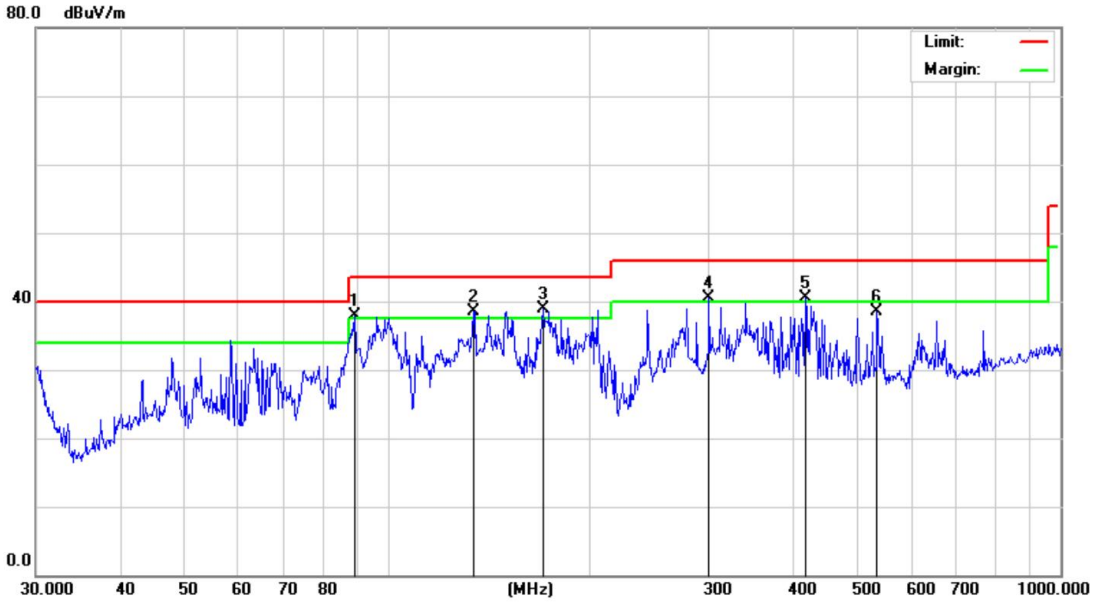
Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	Antenna Polarity	Vertical



Final Average Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	89.2762	37.95	-26.56	43.50	5.55	100	190	Vertical
2	134.0882	38.54	-20.86	43.50	4.96	100	120	Vertical
3	170.1947	38.95	-20.38	43.50	4.55	100	70	Vertical
4	300.3672	40.45	-18.79	46.00	5.55	100	260	Vertical
5	417.6409	40.53	-16.23	46.00	5.47	100	170	Vertical
6	533.8318	38.59	-13.66	46.00	7.41	100	200	Vertical

Result: Pass

Note:

1. Factor=Antenna Factor + Cable loss - Pre-amplifier, Margin=Measurement-Limit.
2. All test modes had been pre-tested. The mode 7 is the worst case and recorded in the report.

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Radiated Emissions Test Results Above 1GHz

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	Antenna Polarity	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804.000	49.36	0.08	49.44	74.00	-24.56	peak
4804.000	40.88	0.08	40.96	54.00	-13.04	AVG
7206.000	49.78	2.21	51.99	74.00	-22.01	peak
7206.000	40.24	2.21	42.45	54.00	-11.55	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	Antenna Polarity	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804.000	49.61	0.08	49.69	74.00	-24.31	peak
4804.000	40.22	0.08	40.30	54.00	-13.70	AVG
7206.000	50.66	2.21	52.87	74.00	-21.13	peak
7206.000	41.50	2.21	43.71	54.00	-10.29	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Result: Pass

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Radiated Emissions Test Results for Above 1GHz

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 8	Antenna Polarity	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4882.000	50.51	0.14	50.65	74.00	-23.35	peak
4882.000	40.88	0.14	41.02	54.00	-12.98	AVG
7323.000	49.78	2.36	52.14	74.00	-21.86	peak
7323.000	40.42	2.36	42.78	54.00	-11.22	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 8	Antenna Polarity	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4882.000	49.50	0.14	49.64	74.00	-24.36	peak
4882.000	39.65	0.14	39.79	54.00	-14.21	AVG
7323.000	49.01	2.36	51.37	74.00	-22.63	peak
7323.000	40.73	2.36	43.09	54.00	-10.91	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Result: Pass

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Radiated Emissions Test Results for Above 1GHz

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 9	Antenna Polarity	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4960.000	48.76	0.22	48.98	74.00	-25.02	peak
4960.000	42.40	0.22	42.62	54.00	-11.38	AVG
7440.000	50.46	2.64	53.10	74.00	-20.90	peak
7440.000	40.75	2.64	43.39	54.00	-10.61	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 9	Antenna Polarity	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4960.000	48.40	0.22	48.62	74.00	-25.38	peak
4960.000	40.67	0.22	40.89	54.00	-13.11	AVG
7440.000	49.81	2.64	52.45	74.00	-21.55	peak
7440.000	40.33	2.64	42.97	54.00	-11.03	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Result: Pass

Note:

1. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
2. Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin = Limit-Emission Level.
3. The “Factor” value can be calculated automatically by software of measurement system.
4. All test modes had been pre-tested. The 8DPSK mode is the worst case and recorded in the report.

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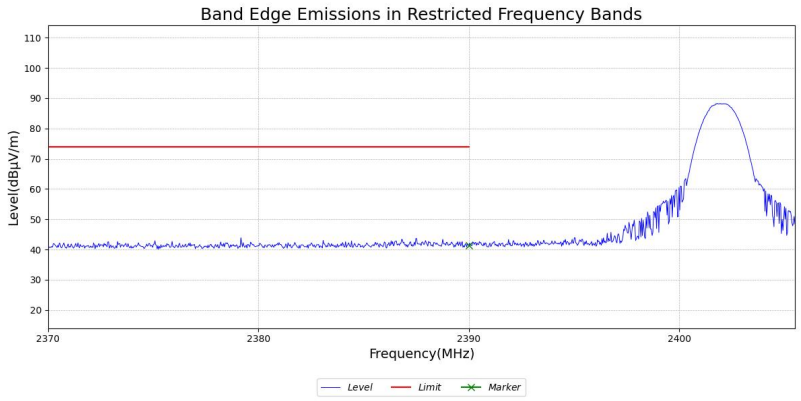
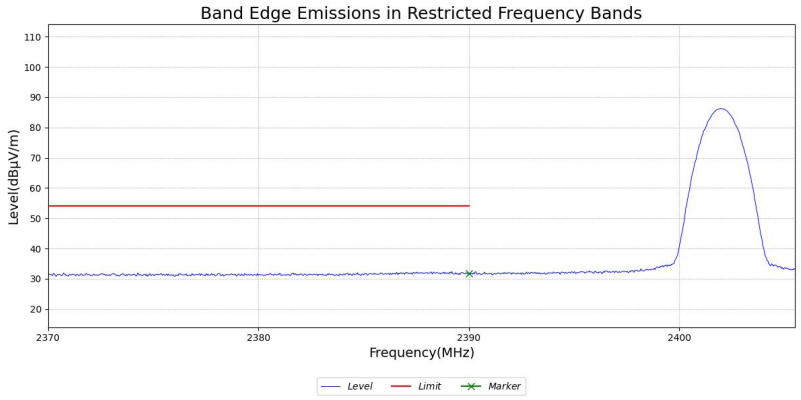
Band Edge Emission Test Results for Restricted Bands

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



Item (Mark)	Freq. MHz	Reading dBµV	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dBµV/m	Limit dBµV/m	Margin dB	Detector	Pol.
1	2390.00	34.90	29.99	30.21	8.35	43.03	74.00	-30.97	Peak	Horizontal
2	2390.00	25.07	29.99	30.21	8.35	33.2	54.00	-20.80	AV	Horizontal

Result: Pass

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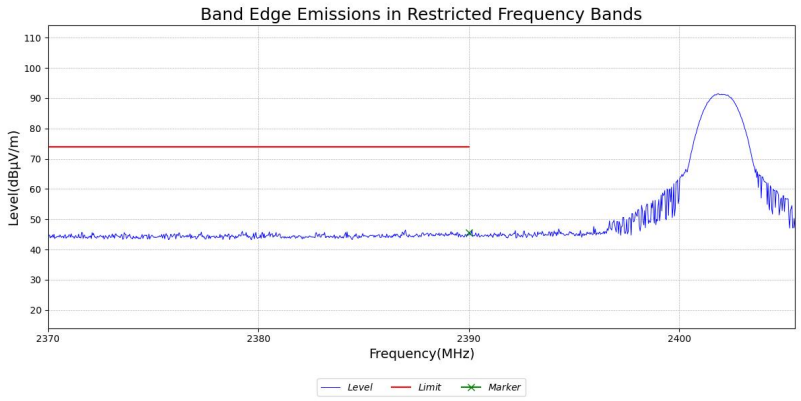
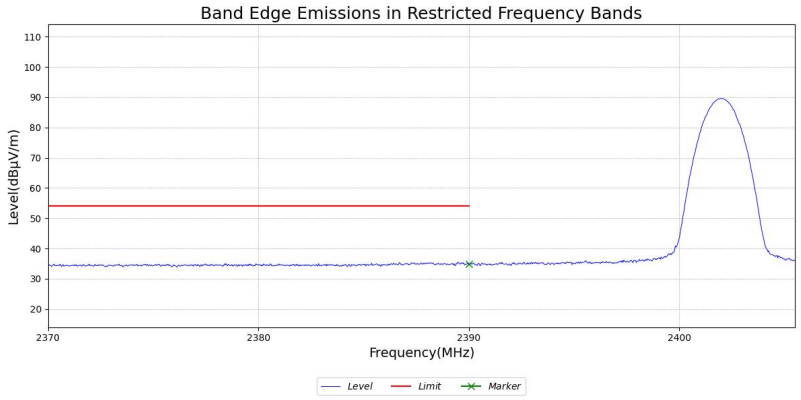
Band Edge Emission Test Results for Restricted Bands

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 7	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



Item (Mark)	Freq. MHz	Reading dBµV	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dBµV/m	Limit dBµV/m	Margin dB	Detector	Pol.
1	2390.00	35.93	29.99	30.21	8.35	44.06	74.00	-29.94	Peak	Vertical
2	2390.00	26.79	29.99	30.21	8.35	34.92	54.00	-19.08	AV	Vertical

Result: Pass

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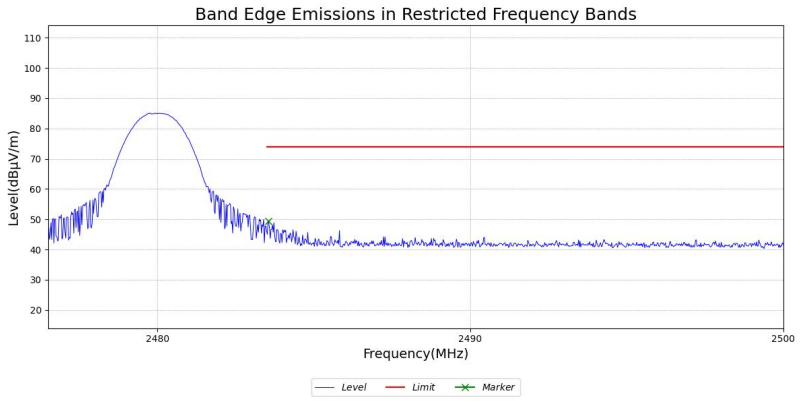
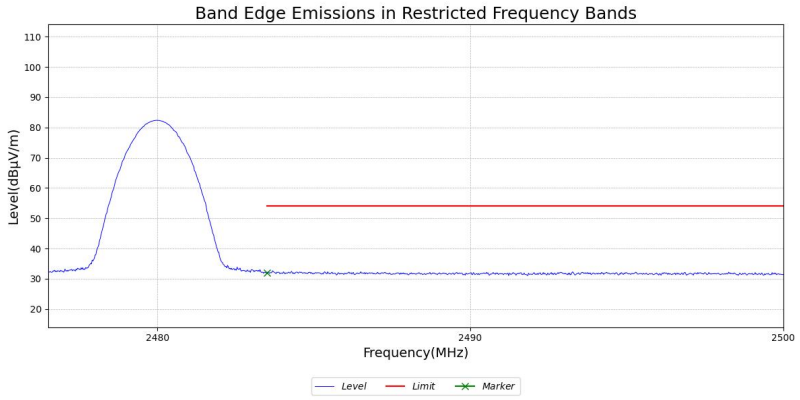
Band Edge Emission Test Results for Restricted Bands

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 9	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



Item (Mark)	Freq. MHz	Reading dBµV	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dBµV/m	Limit dBµV/m	Margin dB	Detector	Pol.
1	2483.50	40.09	30.25	30.25	8.5	48.59	74.00	-25.41	Peak	Horizontal
2	2483.50	23.55	30.25	30.25	8.5	32.05	54.00	-21.95	AV	Horizontal

Result: Pass

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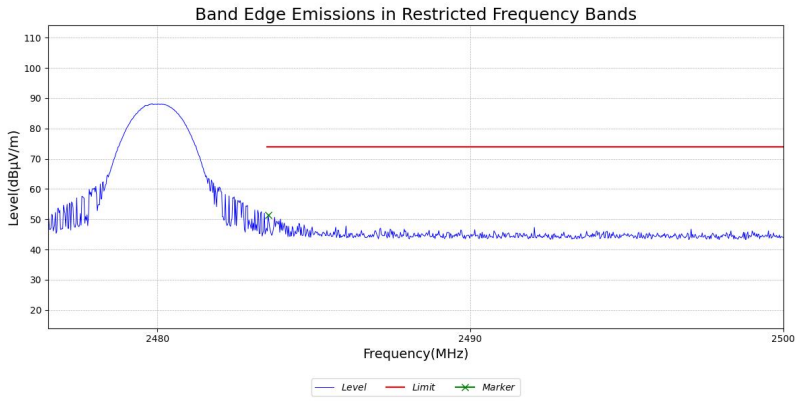
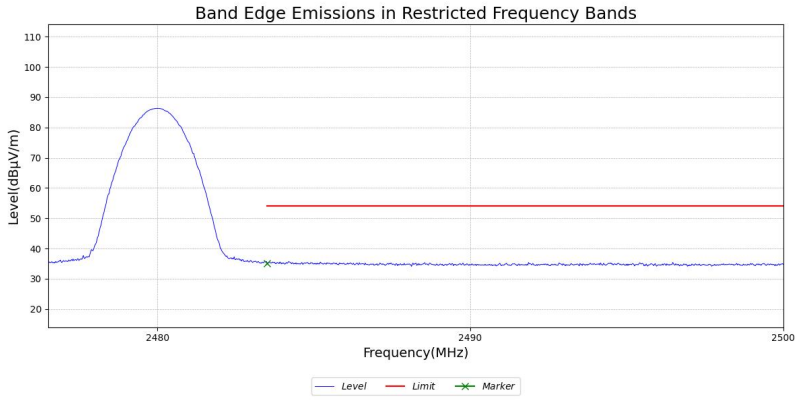
Band Edge Emission Test Results for Restricted Bands

EUT Name	Bluetooth speaker	Model Name	CBS-3027
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 3.7V by battery
Test Mode	Mode 9	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



Item (Mark)	Freq. MHz	Reading dBµV	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dBµV/m	Limit dBµV/m	Margin dB	Detector	Pol.
3	2483.50	42.28	30.25	30.25	8.5	50.78	74.00	-23.22	Peak	Vertical
4	2483.50	26.89	30.25	30.25	8.5	35.39	54.00	-18.61	AV	Vertical

Result: Pass

Note: The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

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10. Number of Hopping Frequency Measurement

10.1 Provisions Applicable

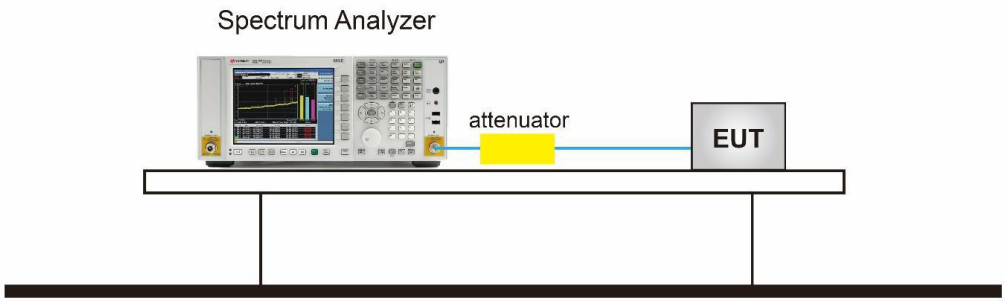
This frequency hopping system must employ a minimum of 15 hopping channels.

10.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span = The frequency band of operation. Depending on the number of channels the device
2. supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
3. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
4. VBW ⩾ RBW
5. Sweep time = Auto couple
6. Detector = Peak
7. Trace mode = Max hold
8. Allow the trace to stabilize

10.3 Measurement Setup (Block Diagram of Configuration)



10.4 Measurement Result

Test Data of Number of Hopping Frequency			
Test Mode	Number of Hopping Frequency	Limits	Pass or Fail
GFSK	79	>=15	Pass
π /4-DQPSK	79	>=15	Pass
8DPSK Hopping	79	>=15	Pass

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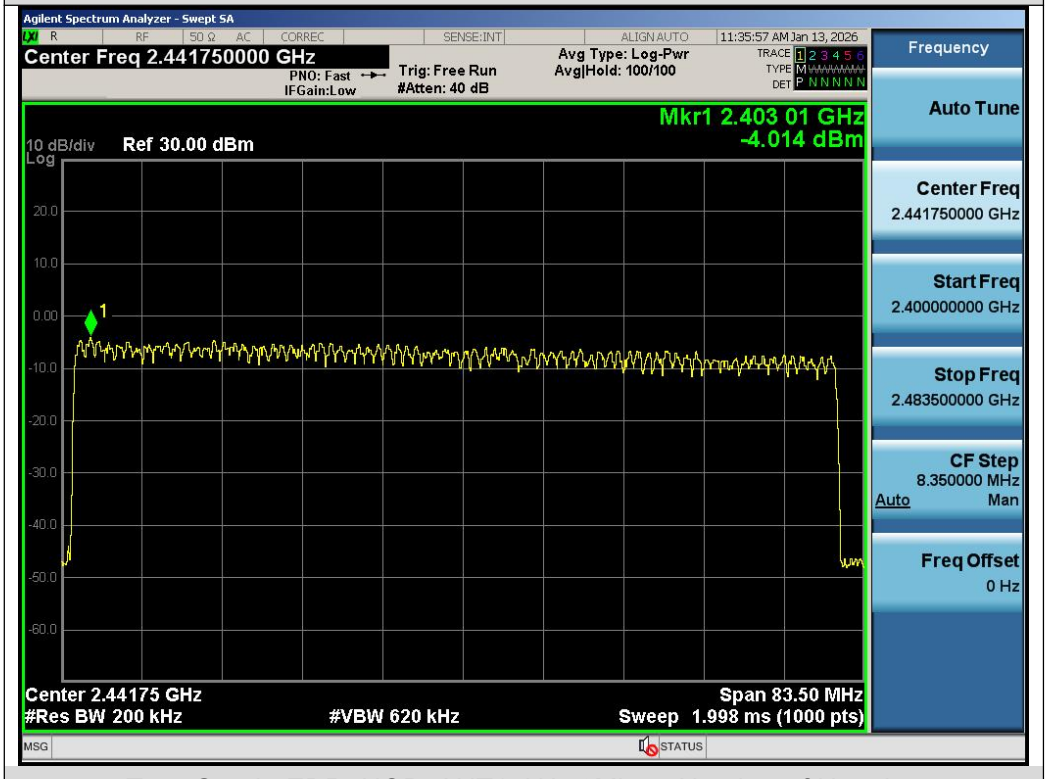
Test Graphs of Number of Hopping Frequency

Test_Graph_BR_HOP_ANT1_NA_1Mbps_Number of Hopping



Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Number of Hopping

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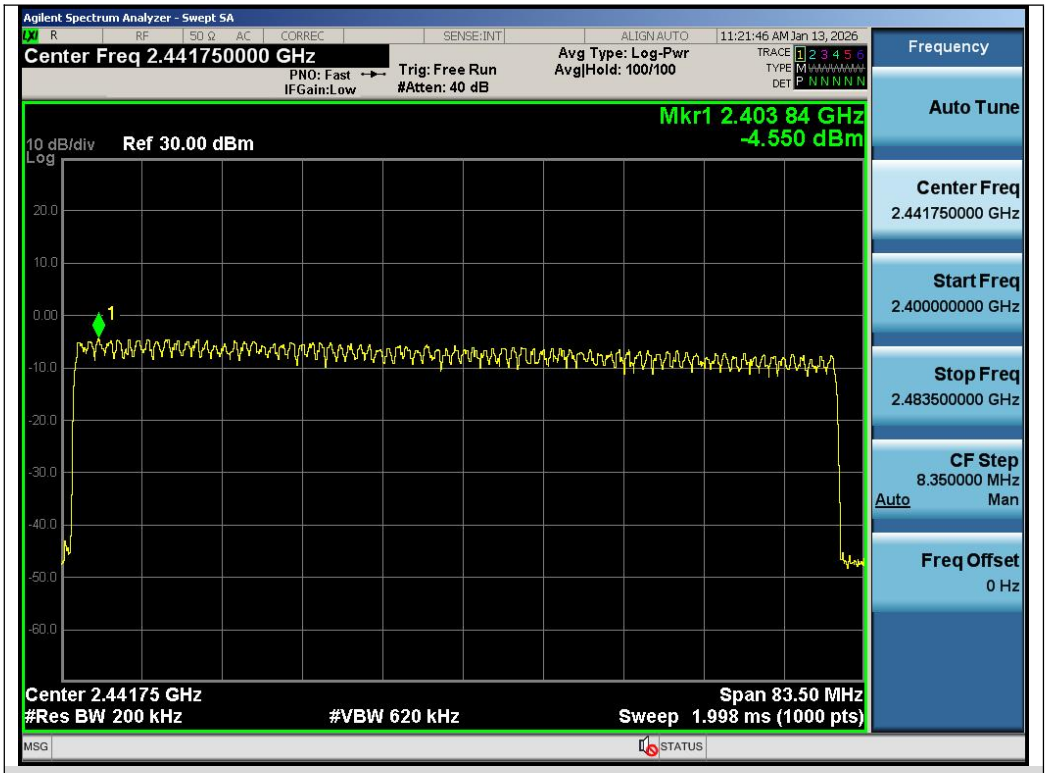

Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Number of Hopping

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11. Time of Occupancy (Dwell Time) Measurement

11.1 Provisions Applicable

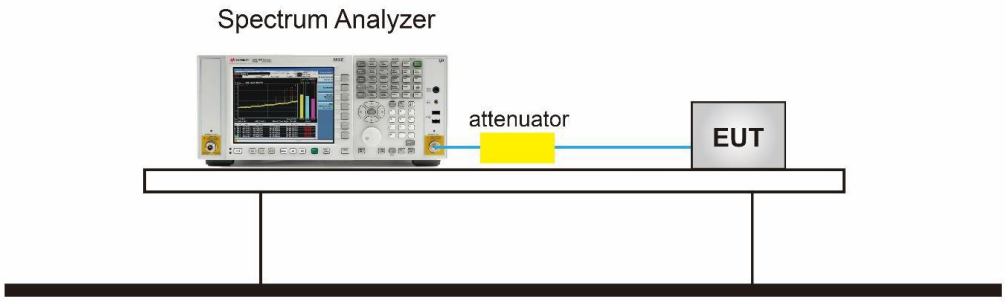
The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

11.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span = Zero span, centered on a hopping channel.
2. RBW shall be ⩽ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
3. VBW ⩾ RBW
4. Sweep time = As necessary to capture the entire dwell time per hopping channel
5. Detector = Peak
6. Trace mode = Free Run
7. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

11.3 Measurement Setup (Block Diagram of Configuration)



11.4 Measurement Result

Test Data of Dwell Time					
Channel	Time of Pulse for 3DH5 (ms)	Number of hops in the period specified in the requirements	Dwell Time (ms)	Limit (ms)	Pass or Fail
2402	2.907	25.0*4	290.700	400	Pass
2441	2.907	25.0*4	290.700	400	Pass
2480	2.907	29.0*4	337.212	400	Pass

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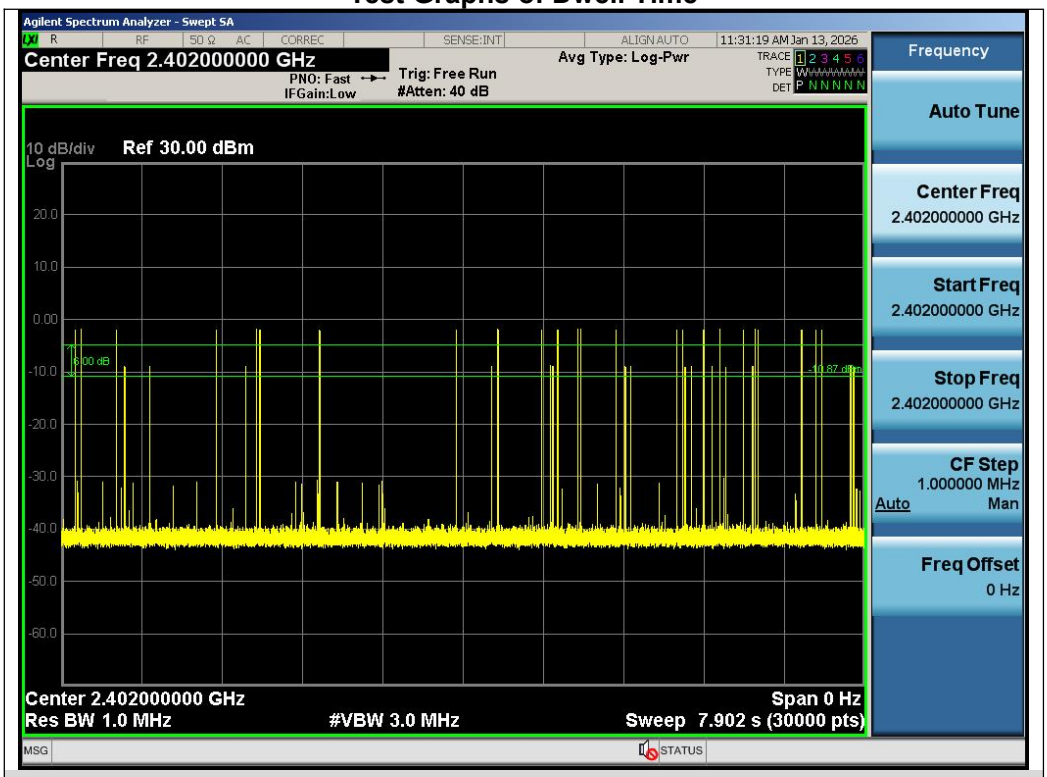
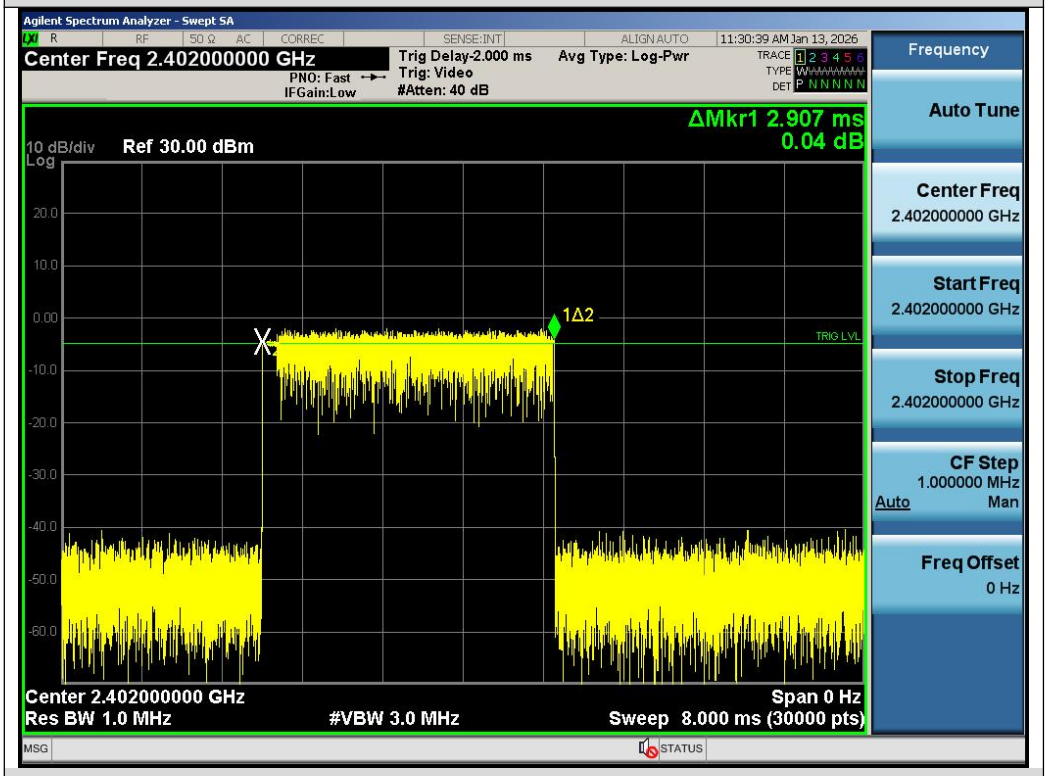
Test Graphs of Dwell Time



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_2402_Number of Busrt



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_2402_Time per Burst

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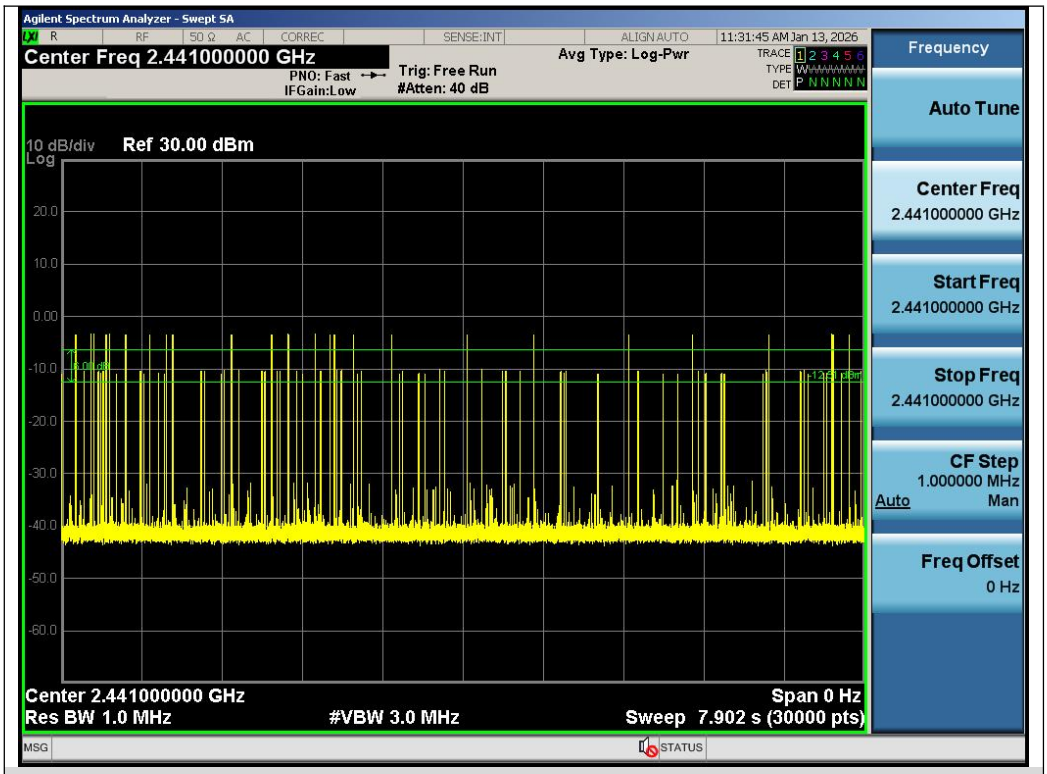
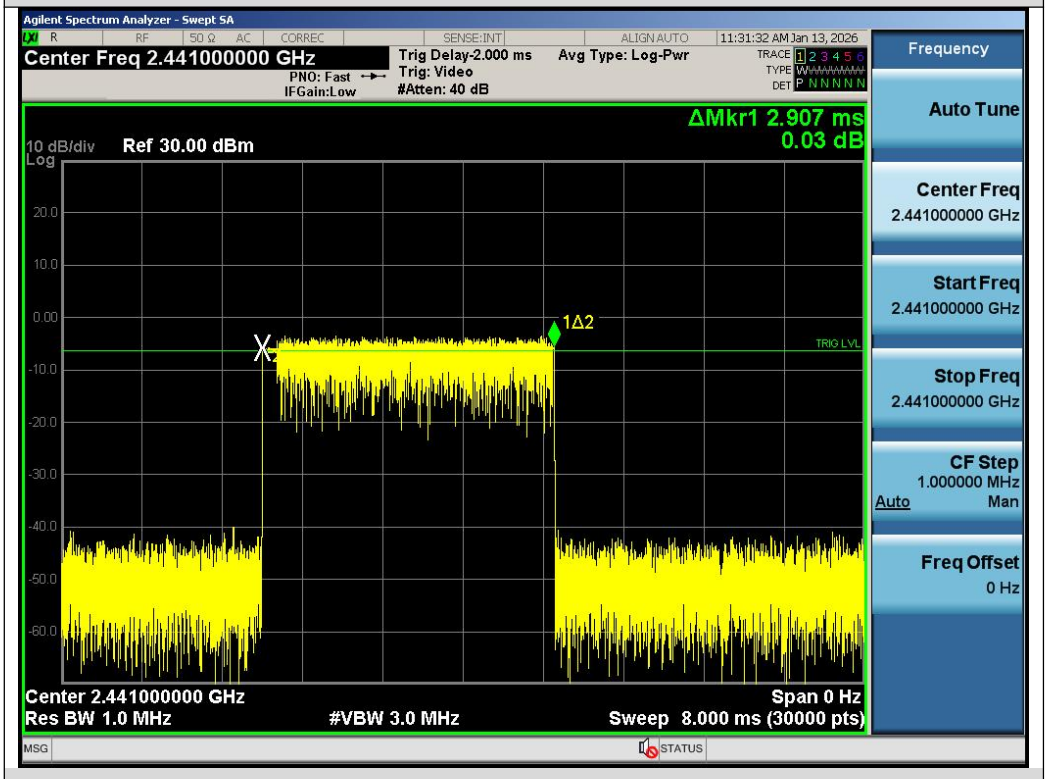
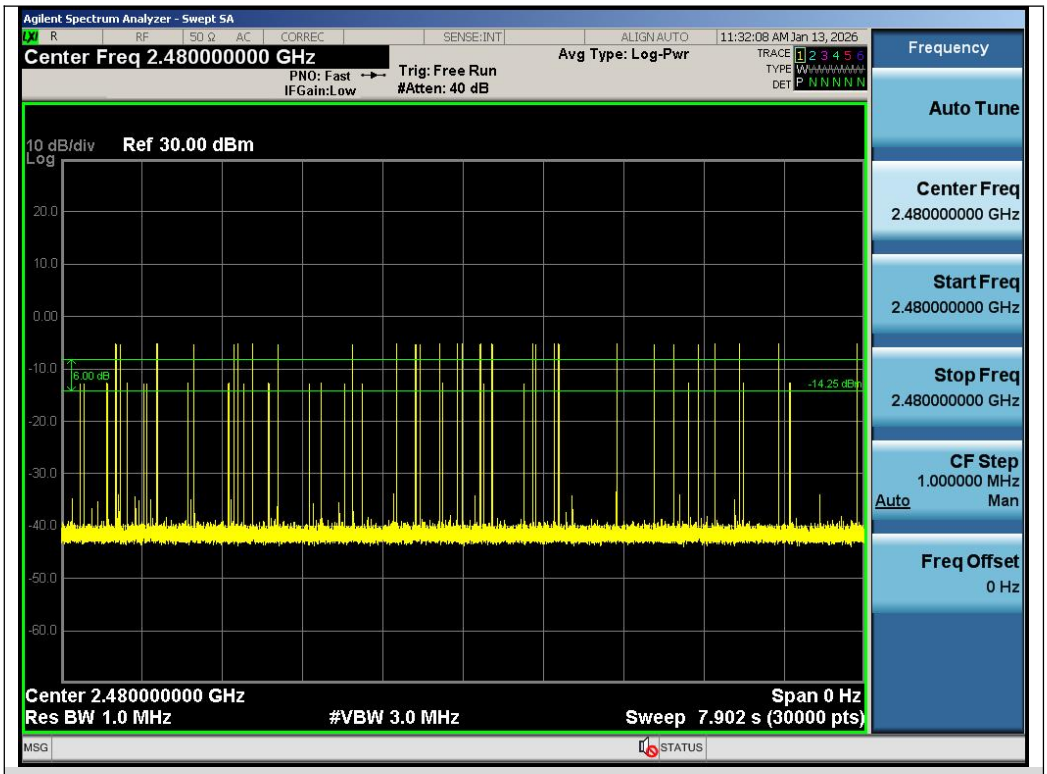


Test_Graph_EDR_HOP_ANT1_NA_3Mbps_2441_Number of Busrt

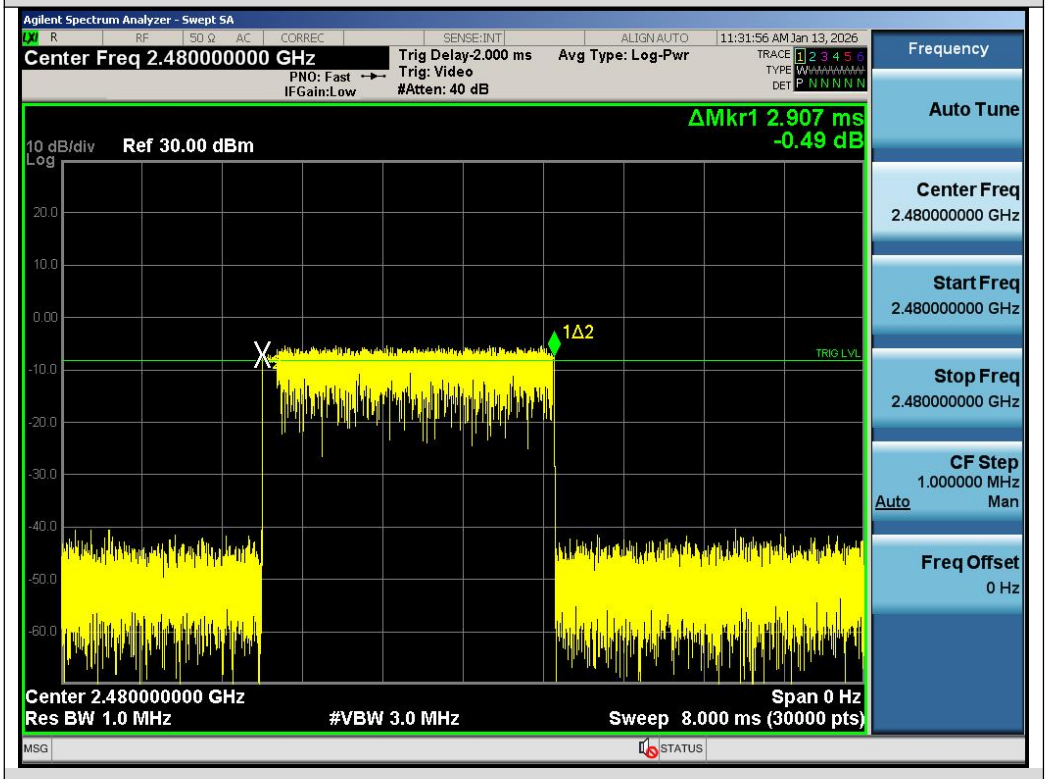


Test_Graph_EDR_HOP_ANT1_NA_3Mbps_2441_Time per Burst

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_2480_Number of Busrt



Test_Graph_EDR_HOP_ANT1_NA_3Mbps_2480_Time per Burst

Note: All mode rates are tested and evaluated, 8DPSK modulated 3DH5 mode is the worst case and documented in the report.

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